ABSTRACT OF THE INVENTION

A process for the preparation of pentafluoroethane is disclosed which involves contacting a mixture comprising hydrogen fluoride and at least one starting material selected from haloethanes of the formula CX_3CHX_2 and haloethenes of the formula $CX_2=CX_2$, where each X is independently selected from the group consisting of F and Cl (provided that no more than four of X are F), with a fluorination catalyst in a reaction zone to produce a product mixture comprising HF, HCl, pentafluoroethane, underfluorinated halogenated hydrocarbon intermediates and less than 0.2 mole percent chloropentafluoroethane based on the total moles of halogenated hydrocarbons in the product mixture. The process is characterized by the fluorination catalyst comprising (i) a crystalline cobalt-substituted alpha-chromium oxide where from about 0.05 atom % to about 6 atom % of the chromium atoms in the alpha-chromium oxide lattice are replaced by trivalent cobalt (Co^{+3}) and/or (ii) a fluorinated crystalline oxide of (i).